

IN THE CLAIMS

The status of each claim is listed below.

Claims 1-85: (Canceled).

Claim 86 (Currently Amended): A method for providing cells with the capacity to produce a protein, the amino acid sequence of which comprises at least one unconventional amino acid, comprising:

(a) introducing at least one missense mutation in a target codon of a gene encoding a protein required for the growth of the cells, wherein the mutated protein synthesized from the mutated gene is not functional in the cells; and

(b) selecting ~~culturing~~ the cells obtained in (a) in a culture medium which (1) does not contain a nutrient compensating for the loss of functionality of the mutated protein and (2) contains an unconventional amino acid which restores the functionality of said protein required for growth of the cells, said unconventional amino acid being that encoded by said target codon ~~any amino acid incorporated in place of the amino acid, which should normally be incorporated at this site with regard to the translated nucleic acid sequence; and~~

(c) culturing the cells obtained in (b) in a culture medium containing said amino acid encoded by said target codon.

Claim 87 (Currently Amended): The method of Claim 86, further comprising an additional ~~second~~ culturing in a ~~second~~ culture medium containing a nutrient compensating for the loss of functionality of the mutated protein.

Claim 88 (Previously Presented): The method according to Claim 86, wherein the step of culturing the cells comprises a series of cultivation steps of the same cells under selective conditions until mutants capable of growing in the absence of the nutrient required by loss of the functionality of the mutated protein are obtained.

Claim 89 (Previously Presented): The method of Claim 86, wherein the missense mutation is chosen from missense mutations which spontaneously reverse at a frequency of one organism from at least 10^{15} .

Claim 90 (Previously Presented): The method of Claim 86, wherein the missense mutation transforms a target codon of a gene encoding a protein required for the growth of said cell, into a codon which, in comparison with the target codon, exhibits a change of at least two bases.

Claim 91 (Previously Presented): The method of Claim 86, wherein the target codon encodes an amphiphilic amino acid.

Claim 92 (Previously Presented): The method of Claim 86, wherein the target codon encodes an amino acid which has a steric volume which is the same as or smaller than the steric volume of the amino acid encoded by the missense mutation.

Claim 93 (Previously Presented): The method of Claim 90, wherein the target codon encodes cysteine.

Claim 94 (Previously Presented): The method of Claim 90, wherein the amino acid encoded by the missense mutation is valine or isoleucine.

Claim 95 (Previously Presented): The method of Claim 86, wherein said introducing is carried out using a vector comprising the mutated sequence of said gene encoding a protein required for the growth of said cells, including said missense mutation.

Claim 96 (Previously Presented): The method of Claim 95, wherein said vector is a plasmid vector.

Claim 97 (Previously Presented): The method of Claim 86, further comprising isolating the cells which grow in said culturing.

Claim 98 (Previously Presented): Method of Claim 97, further comprising culturing the isolated cells in a second culture medium containing said amino acid encoded by said target codon.

Claim 99 (Previously Presented): The method of Claim 98, wherein the concentration of said amino acid in said second culture medium is at a concentration higher than the concentration of said amino acid in said first culture medium, and wherein the method further comprises selecting the cells sensitive to the concentration of said amino acid in said second culture medium.

Claim 100 (Previously Presented): The method of Claim 97, wherein the aminoacyl-tRNA synthetase which recognizes the amino acid encoded by said missense mutation of said selected cells is capable of charging onto one of its associated tRNAs an unconventional amino acid or an amino acid other than said amino acid encoded by said missense mutation.

Claim 101 (Previously Presented): The method of Claim 100, wherein the nucleic acid sequence of the gene encoding said aminoacyl-tRNA synthetase includes at least one mutation compared with the sequence of the corresponding wild-type gene.

Claim 102 (Previously Presented): The method of Claim 101, wherein said mutation in the nucleic acid sequence of the gene encoding said aminoacyl-tRNA synthetase is generated in vivo.

Claim 103 (Previously Presented): An isolated cell obtained by the method of Claim 86, capable of producing a protein, wherein the amino acid sequence of the protein is mutated by comprising at least one unconventional amino acid, wherein the cell comprises an aminoacyl-tRNA synthetase which recognizes a given amino acid and which is capable of charging onto one of its associated tRNAs an unconventional amino acid or an amino acid other than said given amino acid, and in that the nucleic acid sequence of the gene encoding said aminoacyl-tRNA synthetase includes at least one mutation compared with the sequence of the corresponding wild-type gene.

Claim 104 (Previously Presented): The isolated cell of Claim 103, which is a prokaryotic or eukaryotic cell.

Claim 105 (Previously Presented): The isolated cell of Claim 104, which is a prokaryotic cell.

Claim 106 (Previously Presented): The isolated cell of Claim 103, which is selected from the group consisting of the following cells deposited at the CNCM (Collection Nationale de Culture de Microorganismes [National Collection of Microorganism Cultures], Paris, France):

- (a) *E. coli* strain deposited at the CNCM under the No. I-2025 on May 25, 1998,
 - (b) *E. coli* strain deposited at the CNCM under the No. I-2026 on May 25, 1998,
 - (c) *E. coli* strain deposited at the CNCM under the No. I-2027 on May 25, 1998,
 - (d) *E. coli* strain deposited at the CNCM under the No. I-2339 on October 26, 1999,
 - (e) *E. coli* strain deposited at the CNCM under the No. I-2340 on October 26, 1999,
- and
- (f) *E. coli* strain deposited at the CNCM under the No. I-2341 on October 26, 1999.

Claim 107 (Previously Presented): A method of producing a protein the amino acid sequence of which comprises at least one unconventional amino acid, comprising culturing the isolated cell of Claim 103 under conditions to produce the protein.

Claim 108 (Currently Amended): A process for producing a protein the amino acid sequence of which comprises at least one unconventional amino acid, comprising:

- (a) selecting a cell by the a method according to Claim 97;
- (b) culturing said cell selected in (a) in a culture medium and under culture conditions which allow the growth of said cell, and producing a supernatant and a cell pellet; and
- (c) isolating said protein comprising at least one unconventional amino acid from the culture supernatant and/or from the cell pellet obtained from (b).

Claim 109 (Previously Presented): The process of Claim 108, wherein said culture medium in (b) allows the growth of said cell contains said unconventional amino acid or a precursor thereof.

Claim 110 (Previously Presented): The process of Claim 108, wherein said unconventional amino acid is synthesized by said cell.

Claim 111 (Previously Presented): The process of Claim 110, wherein the synthesis of said unconventional amino acid is increased by genetic modification of said cell.

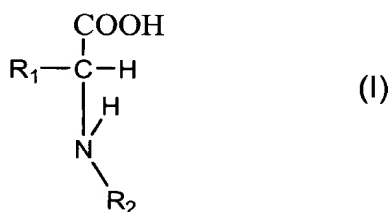
Claim 112 (Previously Presented): The process of Claim 108, wherein said cell is auxotrophic for the amino acid encoded by said target codon.

Claim 113 (Previously Presented): The process of Claim 108, wherein said cell comprises a homologous or heterologous gene of interest the coding sequence of which includes at least one target codon.

Claim 114 (Previously Presented): The process of Claim 113, wherein the culture medium in (b) comprises the compounds required for inducing the synthesis of the protein encoded by said gene of interest.

Claim 115 (Previously Presented): The process of Claim 113, wherein the biological activity of the protein encoded by said gene of interest is at least partially conserved after the incorporation of said unconventional amino acid at the level of the target codon of said gene of interest.

Claim 116 (Previously Presented): The process of Claim 108, wherein the unconventional amino acid is represented by an amino acid of formula I having L configuration:



wherein R_1 or R_2 represents radicals containing a functional group capable of reacting selectively.

Claim 117 (Previously Presented): The process of Claim 116, wherein the functional group is selected from the group consisting of aldehyde, ketone, ethenyl, ethynyl, and nitrile groups.

Claim 118 (Currently Amended): A process for functionalization of a protein comprising incorporating into the amino acid sequence of said protein an unconventional amino acid containing a functional group, wherein said incorporation is done ~~obtained~~ according to the process of Claim 108.